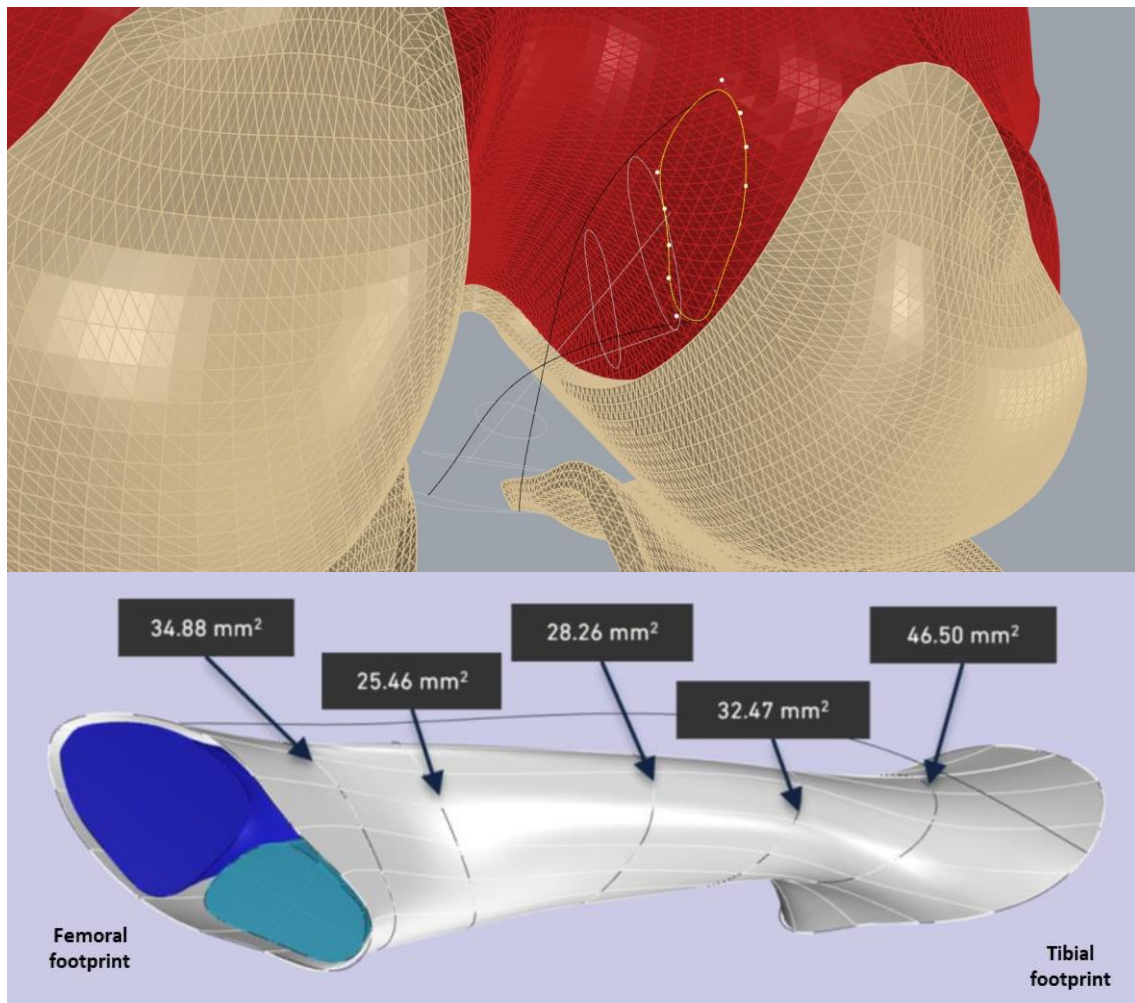
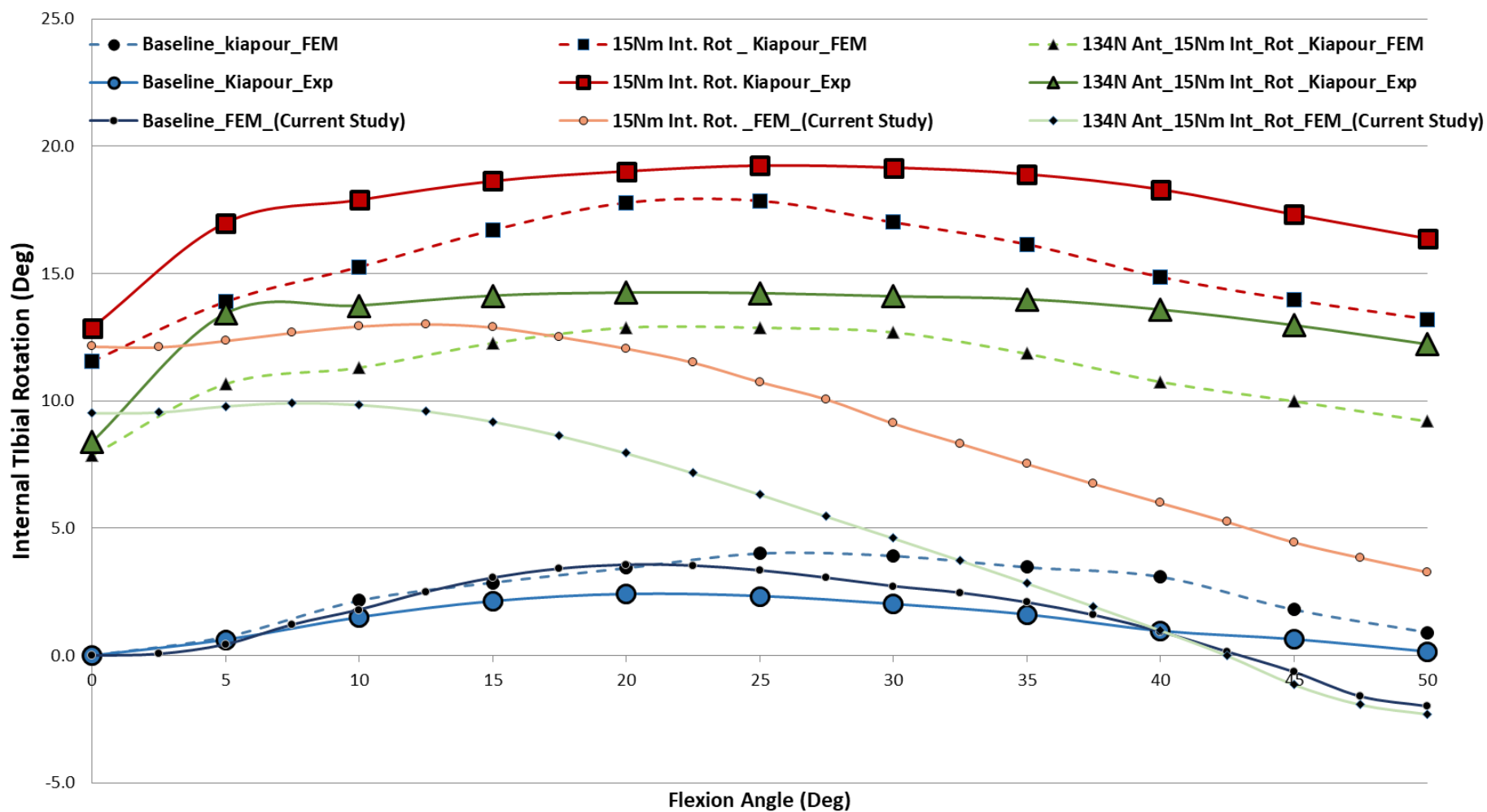


## Supplement 1

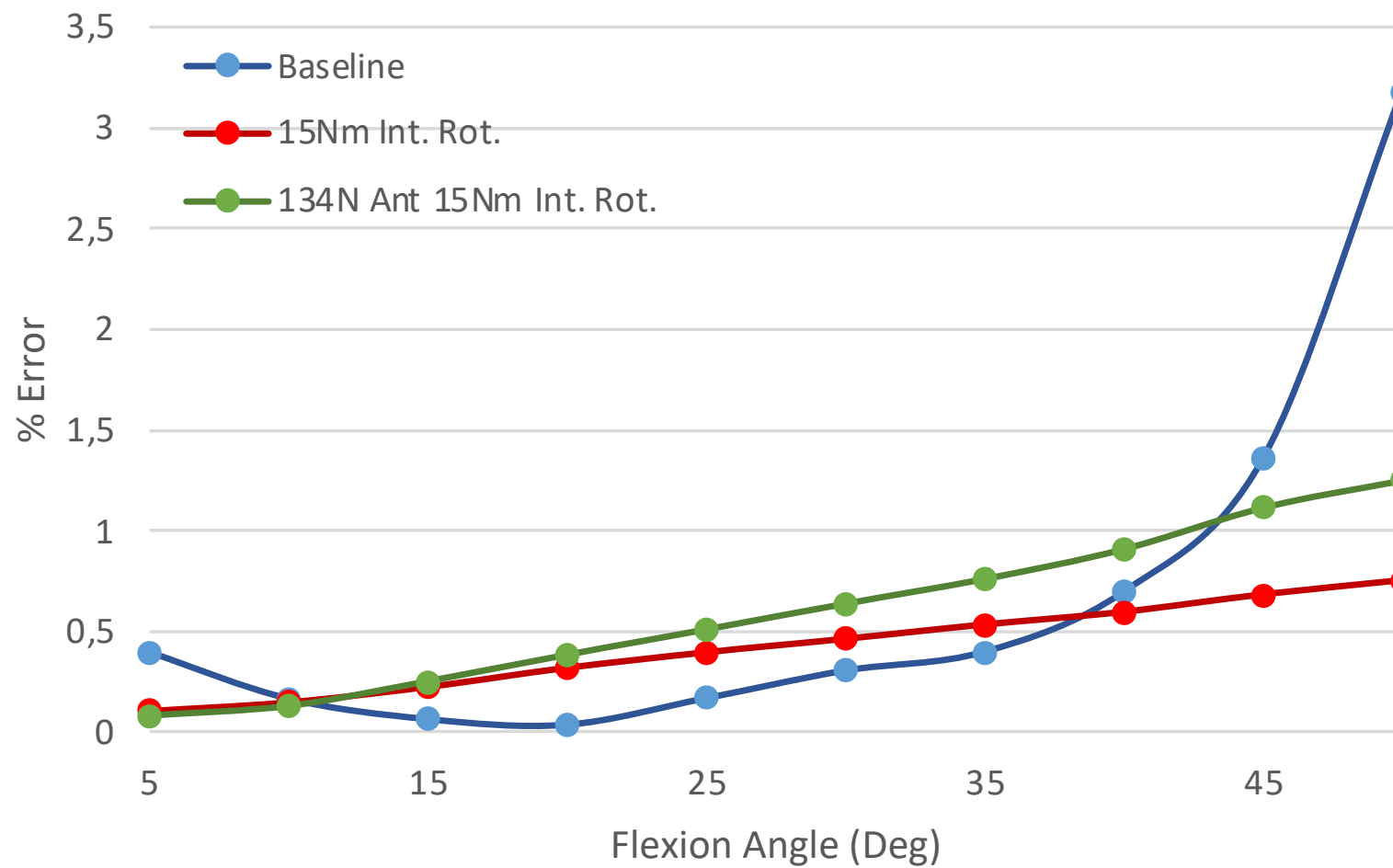


**Figure S1** - FE model showing the five ACL section from its tibial to femoral footprint.

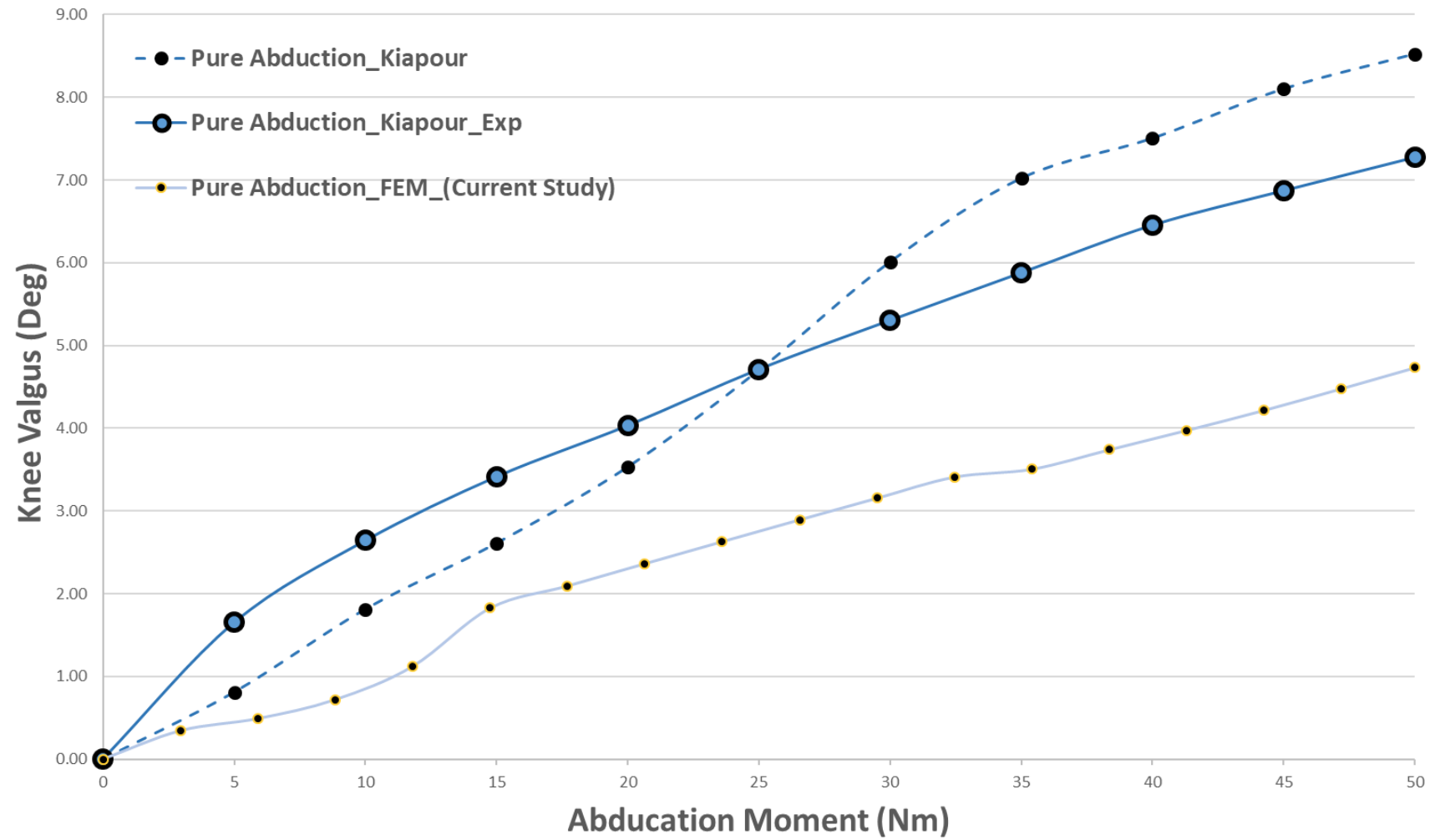
## Supplement 2



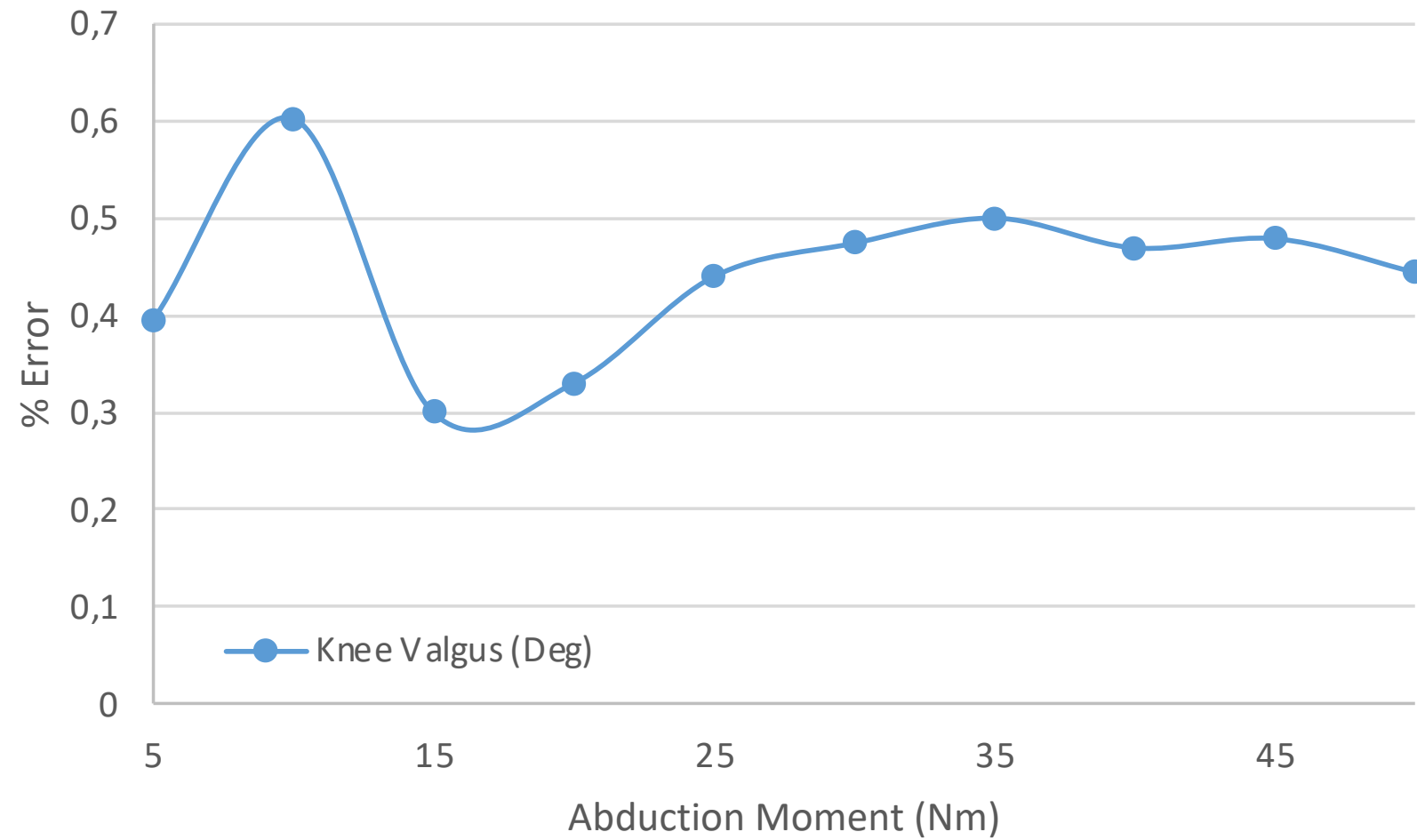
**Figure S2.1** - FE model comparison with literature data for tibiofemoral axial plane kinematics under abduction, internal rotation and sagittal load conditions.



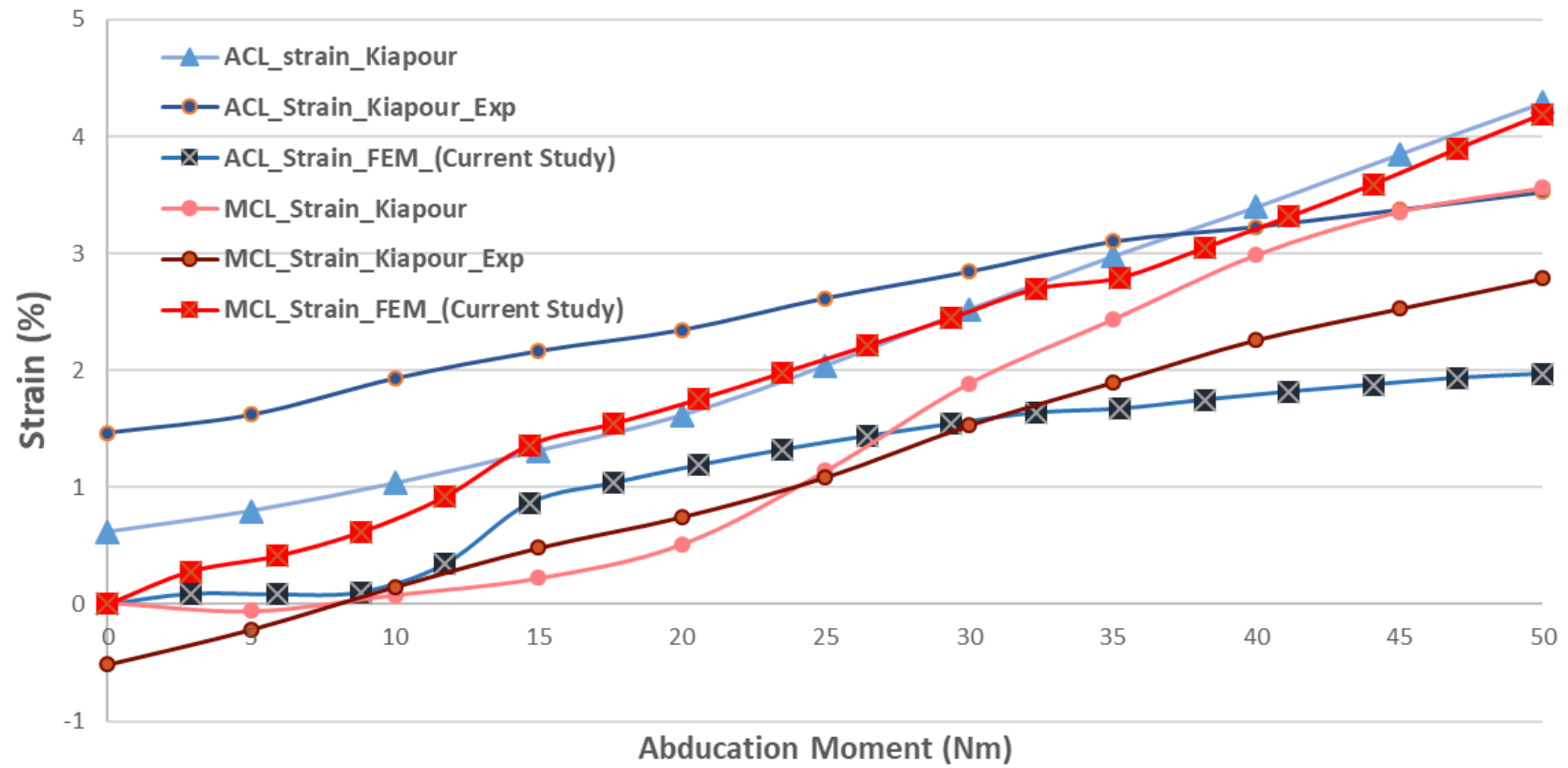
**Figure S2.2** - FE model comparison with Kiapour's et al. FEM data for tibiofemoral axial plane kinematics under abduction, internal rotation and sagittal load conditions.



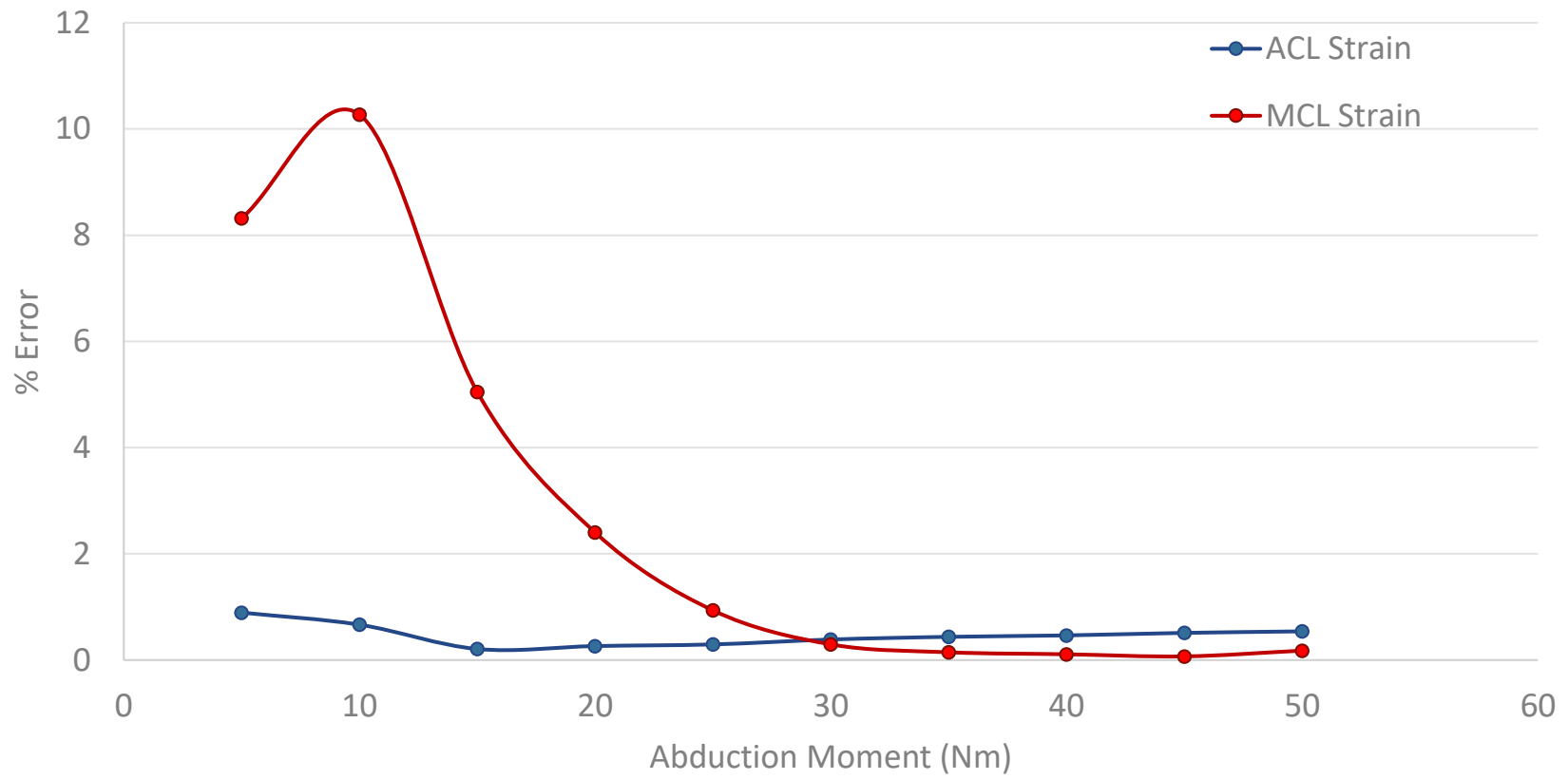
**Figure S2.3** - FE model comparison with literature data for tibiofemoral frontal plane kinematics under 50 Nm abduction moment conditions.



**Figure S2.4** - FE model comparison with Kiapour's et al. FEM data for tibiofemoral frontal plane kinematics under 50 Nm abduction moment conditions.



**Figure S2.5** - Comparison of the maximum strain values obtained in the current study, with literature data for the MCL and ACL structures, under 50 Nm abduction moment conditions.



**Figure S2.56** - Comparison of the maximum strain values obtained in the current study, with Kiapour's et al. FEM data for the MCL and ACL structures, under 50 Nm abduction moment conditions.

## Supplement 3

**Table S1** – Output and location of peak stress and strain for the whole ACL ligament and AM/PL bundles.

# simulation	Whole ligament		AM bundle		PL bundle		Location of Peak Stress / Strain
	Peak Stress (MPa)	Peak Strain	Peak Stress (MPa)	Peak Strain	Peak Stress (MPa)	Peak Strain	
#1	6.830	0.15	6.830	0.032	4.15	0.020	Mid(AM)/Mid(PL)
#2	<b>11.00</b>	<b>0.25</b>	<b>11.00</b>	<b>0.048</b>	<b>7.72</b>	<b>0.034</b>	<b>Mid(AM)/Mid(PL)</b>
#3	5.300	0.11	5.300	0.026	2.62	0.013	Mid(AM)/Mid(PL)
#4	10.40	0.23	10.40	0.046	7.21	0.032	Mid(AM)/Mid(PL)
#5	6.780	0.14	6.780	0.032	4.14	0.020	Mid(AM)/Mid(PL)
#6	<b>11.00</b>	<b>0.25</b>	<b>11.00</b>	<b>0.048</b>	<b>7.68</b>	<b>0.034</b>	<b>Mid(AM)/Mid(PL)</b>
#7	6.000	0.12	6.000	0.029	3.40	0.016	Mid(AM)/Mid(PL)
#8	10.30	0.2	10.30	0.045	7.12	0.032	Mid(AM)/Mid(PL)
#9	5.020	0.12	5.020	0.026	2.01	0.009	Mid(AM)/ Distal(PL)
#10	8.850	0.21	8.850	0.040	5.83	0.027	Mid(AM)/Mid(PL)
#11	4.450	0.10	4.450	0.023	1.44	0.007	Mid(AM)/ Distal(PL)
#12	7.680	0.18	7.680	0.035	4.65	0.022	Mid(AM)/Mid(PL)
#13	4.710	0.11	4.710	0.024	1.70	0.008	Mid(AM)/ Distal(PL)
#14	8.080	0.19	8.080	0.037	5.05	0.024	Mid(AM)/Mid(PL)
#15	4.040	0.09	4.040	0.020	1.01	0.006	Mid(AM)/ Distal(PL)
#16	6.960	0.17	6.960	0.033	3.83	0.019	Mid(AM)/Mid(PL)

**Legend:** Mid – midportion; AM – anteromedial; PL – posterolateral.